High impact learning and teaching using 3D design and 3D printing in primary school Makerspaces

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Makerspaces and 3D printing have been heralded as enabling new forms of creativity and student-centred learning. However, there is limited research examining their impact on learning, particularly for younger children. This study aimed to characterise the nature of learning and teaching when 3D design and printing was integrated into everyday classroom activities and identify influences on learning outcomes and learner engagement. Utilising pre- and post-questionnaires, classroom observations, teacher reflections, teacher focus groups and student interviews, the mixed methods approach examined students’ learning in offline and online makerspaces activities. Participants included twenty-seven teachers and K-2 students in their classes from across three public primary schools in Greater Sydney. Findings suggest that 3D design and printing activities in makerspaces help students to develop their creative thinking, problem-solving, critical thinking, design thinking, inquiry and STEM capabilities, while promoting high levels of engagement, collaboration and autonomy. The makerspaces module enabled K-2 students to see how science, technology, engineering and mathematics related to the world around them, and teachers observed how teaching in makerspaces shifted them towards more open, communal, collaborative, purposeful, contingent and dynamic pedagogies. Professional learning and teaching experience in makerspaces made significant contributions to teachers’ confidence, enthusiasm and professional identity.